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WALL COVERING AND ITS MANUFACTURING AND INSTALLATION METHODS

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The present invention relates to a wall covering of the type comprising a visible decorative layer, for example made of fabric, woven fabric or nonwoven fabric and a lining which provides a seal against so-called painter's glue and which is integrally connected to the decorative layer. The invention also concerns a method for the manufacture of the coating of the above-mentioned type, method according to which one joins the decorative layer and its lining with the aid of a thermoplastic binder by subjecting the constitutive elements of said covering to a thermal treatment under pressure.

As a lining which provides a seal against the painter's glue, one generally uses paper which also procures, if necessary, dimensional stability to the decorative layer. It has also already been proposed to use as lining a nonwoven textile sheet, but in this case, the nonwoven textile is combined with a decorative layer made of a plastic material or with an intermediate layer made of a honeycombed plastic material. Indeed, to ensure the adhesion of the nonwoven

fabric, one must soak it with special glue which is compatible with the nature of the fibers of the nonwoven textile to ensure a good glue-fiber bonding. The sealing intermediate layer or the sealing decorative layer itself then prevents the glue which has passed through the nonwoven textile from producing spots on the decorative face and making it unusable. Moreover, for the gluing of the decorative layer and of the lining, the known methods require the spreading of a glue made of a thermoplastic substance. This spreading must be carried out with great care and it must be rigorously measured to prevent the passage of the plastic glue through the permeable decorative layer and any local deterioration of the appearance of the latter. When one uses a nonwoven textile as a lining, the thermoplastic substance which is used as an adhesive between the decorative layer and the lining, and which is subjected to a thermal treatment under pressure, for example in a calender, frequently passes through the nonwoven textile and plasticizes the back face of the latter, thus rendering it practically unsuitable for being glued to the wall with the aid of the conventional painter's glues. This is the reason why, in practice, one tends to use paper instead of a lining made of nonwoven textile. Another reason which tends to reduce the use of nonwoven textiles as linings for a wall coating is the fragility of these textiles.

The invention eliminates the above-mentioned drawbacks, and its purposes particularly include the formation of a covering of the initially mentioned type, which comprises, as a lining, a nonwoven textile sheet which promotes the placement of the wall covering, strongly adheres to the decorative layer, constitutes a sealed screen between the two surfaces (front and back) of the wall covering and presents, on the one hand, a perfect dimensional stability and, on its back face, very satisfactory hydrophilic properties.

This purpose is achieved according to the invention because of the fact that, on its face which is turned toward the decorative layer, the sheet of nonwoven textile is coated with a binder made of thermoplastic substance in a quantity which is insufficient to impregnate the totality of said sheet of nonwoven textile, but sufficient to constitute a continuous film which entirely covers the corresponding face of said sheet of nonwoven textile while strongly adhering to the back face of the decorative layer, and because the back face of the sheet of nonwoven textile as well as the visible face of the decorative layer are entirely free of said binder.

Owing to the invention, one achieves a wall covering whose appearance is entirely satisfactory, and which presents stable dimensions, is easy to install, has perfect sealing properties and an increased capacity for absorbing moisture on its back face which is intended to be placed against the wall after the latter is coated with painter's glue.

The invention also relates to the manufacture of a wall covering as defined above. The manufacturing method according to which the decorative layer is joined at its lining, which is made from nonwoven textile, with the aid of a thermoplastic binder, by submission of these elements to a thermal treatment under pressure, is characterized, according to the invention by

the fact that one uses a sheet obtained by a wet papermaking method as the sheet of nonwoven textile, by the fact that after this sheet of nonwoven textile has been manufactured, one deposits, by extrusion onto one of its faces a continuous thin film made of a thermoplastic substance in a quantity which is insufficient to impregnate said sheet of nonwoven textile and one then joins this sheet and this film by passing them through a calender, and finally one joins the sheet complex consisting of a nonwoven textile and a film of thermoplastic binder to the decorative layer, by subjecting the combination of these elements to a thermal treatment under pressure in an assembling machine with a heating cylinder which is partially surrounded by a race, where the processing temperature is at least 50° higher than the softening point of the thermoplastic binder considered, and the treatment duration is at least longer than 15 sec.

Owing to this method, the decorative layer is intimately bound to the sheet of nonwoven textile without the thermoplastic binder appearing on either side of the wall covering according to the invention. In addition, the decorative layer and the sheet of nonwoven textile present a sufficient resistance to tearing off for the purpose of maintaining the decorative layer at the chosen location for many years. However, on the other hand, the bonding between the sheet of nonwoven textile and the decorative layer can be destroyed by tearing off the decorative layer, to the extent that this layer is sufficiently cohesive itself and the nonwoven textile is sufficiently thick to delaminate in its thickness. This presents the advantage that, after tearing off the decorative layer, one finds a smooth and clean face, which is ready to receive another wall covering.

The object of the present invention will be better understood following a reading of the embodiment described below.

The single figure of the drawing in the appendix is a schematic representation of a lateral view of the assembling machine.

One first prepares the sheet of nonwoven textile, preferably by a papermaking route. The thickness of this sheet can vary greatly; however, it is desired that it be not less than a few hundredths of a millimeter, and greater than several millimeters. It is preferred for the thickness of the sheet of nonwoven textile not to exceed several tens of millimeters. This manufacture is analogous to the one used in papermaking, but in the present case, one can use less binder in the baths of fibers than in the general case to cause said fibers to adhere once they are assembled on a drying drum.

According to another characteristic of the invention, one adds to this sheet of nonwoven textile a thermoplastic substance in the form of a film, after the sheet of nonwoven textile has dried. For this purpose, one coats one side of the sheet of nonwoven textile with a very thin layer, that is, with a film made of thermoplastic substance, which is obtained by extrusion above

said sheet and that one deposits it in the fluid state on the latter, and, finally, one cools the assembly made of a nonwoven textile and a thermoplastic film by passing it through a calender.

Depending on the intended purpose, one wishes to maintain, on one of the faces of the sheet of nonwoven textile, the back side, a certain porosity which imparts a hydrophilic property to the sheet, while at the same time achieving a perfectly gasproof surface on the other face of this sheet.

Thus, the quantity of thermoplastic substance used must be measured. It has been observed that in the case of a polyethylene film, quantities of 20-40 g/m<sup>2</sup> of thermoplastic substance procure good results. These limit quantities are clearly a function of the nature of the thermoplastic substance used and of the intended purpose. In general, the lower limit of the quantity of thermoplastic substance is determined by the fact that one must obtain, on one of the faces of the sheet of nonwoven textile, a thin film which must however be continuous and completely cover the sheet of nonwoven textile once assembled with the decorative layer. Below a certain quantity of thermoplastic substance per m<sup>2</sup>, the film cannot be continuous. The upper limit of the quantity of thermoplastic substance which must be continuous at all places, which must not be stiff in general, and which must be capable of being rolled and folded with small radii of curvature, notably to be able to be adapted to the different corners of the rooms [sic].

Once a sheet of nonwoven textile and the thermoplastic film have been joined, this assembly can easily be manipulated, for example, it can be wound before being used and sent to the assembly station where it is joined with a decorative layer to constitute the final wall covering.

The assembling of the sheet of nonwoven textile, fitted with the thermoplastic film and the decorative layer, is carried out in an assembling machine such as the one represented in the drawing of the appendix. The assembling machine, as represented in the drawing, comprises, on each one of the two supports 1, 2, a storage roller 3, 4 and a return roller 5, 6. On the first storage roller 3, a web is wound which constitutes the decorative layer 7, where the decorative face is turned away from the rollers 3, 5 and turned toward the exterior of the decorative band roller 7. The band 8, consisting of the complex made of a sheet of nonwoven textile and a thermoplastic film, and serving as the lining, is wound on the storage roller 4 in such a manner that the free face of the nonwoven textile is located on the side of the lining band 8 which is turned toward the roller 4 and the face of said textile coated with the thermoplastic film is turned toward the exterior and is in a position opposite the back of the decorative band 7 during the assembly of the latter with said complex consisting of the lining band 8. The support 2 of the storage roller 4 for the lining band 8 comprises, below said roller 4, a preparation table 9 where the two bands 7, 8 are superposed in such a manner that the decorative face of the band 7 rests directly on said table 9, where the return roller 6 serves at the same time as compression roller. At the downstream end

of this preparation table 9, the assembly of decorative band 7 and lining band 8 is again taken up by an assembling machine 10 which comprises, on a frame 11, a heated hollow drum 12 which is surrounded, over a large part of its periphery, for example, over 300 degrees and at least 90 degrees, by a race 13 which serves as counterpressure means and consists of an endless band 14 surrounding a large part of said drum and passing around a certain number of guide and return rollers 15; a tension roller 16 mounted with adjustable position on the frame 11 and located outside of the loop formed by the race 13 allows the regulation of the tension of the latter and thus of the application pressure against the drum 12. On the frame 11 one also provides, downstream of the assembling machine, several return rollers 17, which guide the finished coating 18 toward a storage roller.

It should also be specified that the assembling machine differs, in its design and operation principle, from a calender where the contact between the two pressure cylinders is along a single straight line. In the assembling machine which comprises the heated drum and a race, the different constitutive elements 7, 8 of the covering are introduced in such a manner that the uncoated face of the thermoplastic film of the nonwoven textile sheet is in contact with the heated drum 12 and the thermoplastic film is located opposite the back of the decorative band 7 whose decorative face then comes in contact with the race 13.

The treatment temperatures used in this machine are a function of the nature of the thermoplastic substance used. In general, the temperatures at the surface of the drum 12 are at least 50° higher than the temperature corresponding to the softening point of the used thermoplastic substance.

The residence time of the assembly constituting the wall covering in the assembling machine 10 is also a function of the nature of the thermoplastic substance used. In general, this time is longer than 15 sec and does not exceed 120 sec.

The pressure which is used to apply the constitutive elements 7, 8 of the wall covering against the heated drum 12 is on the order of 100 g/cm<sup>2</sup> and it can reach several kg/cm<sup>2</sup> as a function, naturally, of the nature of the decorative layer used. Indeed, when this layer is made of thin paper, the pressure can be very high, while, in the case where this decorative layer consists either of a threaded nonwoven textile, or a honeycombed layer, the pressure must be relatively low.

It should also be noted that, if the lining band 7 comes from the calendering, which is the final operation of its manufacture, the thermoplastic film is not yet well anchored on its support, the sheet of nonwoven textile. Indeed, the deposition by extrusion of the thermoplastic substance on the sheet of nonwoven textile and the passage of the assembly through a cooling calender prevent said sheet from being impregnated in depth by the thermoplastic substance. It is only in the assembling machine 10 that the thermoplastic substance is raised to a sufficiently high

temperature and for a sufficiently long duration to allow it to partially impregnate, in the fluid state, the sheet of nonwoven textile and to adhere to the back of the decorative layer without the continuity of the thermoplastic film being destroyed and without said thermoplastic substance penetrating through the decorative layer.

Since this thermoplastic substance constitutes a binder between the sheet of nonwoven textile and the decorative layer, one can use other substances such as a linear polyethylene (grade 3) such as, for example, branched polyethylene, propylene, polyester, etc.).

If polyamides are used, it is clear that the treatment temperature must be relatively low to prevent the shrinkage of these substances. For example, the treatment temperatures which are indicated for the assembly of the sheet of nonwoven textile and of the decorative layer are, for linear polyethylene of grade 3, 220-240°; for branched polyethylene, 180-200°; and for polypropylene, 230-260°. In general, the treatment temperature is 50-100° higher than the softening point of the thermoplastic substance used.

As raw material for the sheet of nonwoven textile, one can use all types of fibers such as natural or artificial cellulose fibers, synthetic fibers, alone or in a mixture; however, according to the invention, preference is given to cellulose fibers and glass fibers.

If one uses glass fibers as the sheet of nonwoven textile and for the decorative layer, one can prepare a perfectly fire-resistant wall covering.

As the decorative layer, one can use painted paper, tufted nonwoven textile or another material, or thin and flexible sheets made of natural materials, thermoplastic substances, which may be honeycombed or not, or textiles such as nonwoven fabrics or woven fabrics. In addition, it is not necessary to use, for the decorative layer, textiles or woven fabrics with tight meshes. Indeed, since the sheet of nonwoven textile combined with the thermoplastic film located on the back of the decorative layer can present a sizing, one can use, for the decorative layer, fabrics whose distance between the different weft and warp threads is relatively long and woven fabrics with a relatively loose mesh. In this case, it is the combination of the sheet of nonwoven textile and of the thermoplastic film which confers all the dimensional stability to the assembly of the wall covering. Moreover, since the quantity of thermoplastic substance is small, it does not fill the interstices between the different threads of the fabric and the meshes of the woven fabric so that one obtains a wall covering which keeps the appearance and the relief of the decorative layer.

The final product obtained by the above-described method is a wall covering which presents, on the one hand, an extremely high dimensional stability and which, on its back side, is sufficiently porous and hydrophilic to allow its placement on walls which have first been coated with glue, while nevertheless not requiring any prior wetting of the back side.

The object of the present invention can be subjected to certain modifications; thus, one can use as binder, polyesters, acrylic mixtures, etc., without leaving the scope of the invention described in the claims in the appendix.

### Claims

1. Wall covering of the type comprising a visible decorative layer, for example, made of fabric, woven fabric, nonwoven, and a lining which provides a seal against so-called painter's glue and which is integrally connected to the decorative layer, characterized in that the sealing lining consists of a sheet of nonwoven textile which, on its face that is turned toward the decorative layer, is coated with a binder made of a thermoplastic substance in a quantity which is insufficient to impregnate the totality of said sheet of nonwoven textile, but sufficient to constitute a continuous film which entirely covers the corresponding face of said sheet of nonwoven textile, while strongly adhering to the back face of the decorative layer, and in that the back face of the sheet of nonwoven textile as well as the visible face of the decorative layer are entirely free of said binder.
2. Wall covering according to Claim 1, characterized in that the sheet of nonwoven textile is obtained by a papermaking route.
3. Wall covering according to one of Claims 1 and 2, characterized in that the binder made of a thermoplastic substance is assembled with the sheet of nonwoven textile in the form of a thin sheet which covers only one face of the sheet of nonwoven textile and which leaves the other face of the latter entirely free.
4. Wall covering according to one of the preceding claims, characterized in that the thermoplastic substance consists of linear or branched polyethylene, polypropylene, polyamides, polyesters or an acrylic mixture.
5. Wall covering according to one of Claims 1-4, characterized in that the sheet of nonwoven textile comprises natural or artificial cellulose fibers, synthetic fibers alone or in mixtures, and glass fibers.
6. Wall covering according to one of Claims 1-5, characterized in that the decorative layer consists of painted paper, a woven or nonwoven textile, or a knitted textile, a sheet made of a thermoplastic natural substance, which may be honeycombed or not.
7. Method for the manufacture of a wall covering according to one of the preceding claims, according to which the decorative layer is joined at its lining made of nonwoven textile with the aid of thermoplastic binders by subjecting these elements to a thermal treatment under pressure, characterized in that, after the construction of the sheet of nonwoven textile, one deposits by extrusion onto one of its faces, a continuous thin film made of a thermoplastic substance in a quantity which is insufficient to impregnate said sheet of nonwoven textile and in

that one then joins this sheet and this film by passing them through a calender, and finally in that one joins the lining consisting of the complex made of a sheet of nonwoven textile and a film of thermoplastic binder with the decorative layer by exposing all these elements to a thermal treatment under pressure, where the treatment temperature is at least 50°C higher than the softening point of the thermoplastic binder considered and the treatment duration is at least longer than 15 sec.

8. Method for the manufacture of a wall covering according to Claim 7, characterized in that the duration of the thermal treatment is at most 120 sec.

9. Method for the manufacture of a wall covering according to Claim 7, characterized in that the treatment temperatures are at most 100°C higher than the temperature corresponding the softening point of the thermoplastic substance used as a binder.

10. Method for the manufacture of a wall covering according to Claim 7, characterized in that one uses as binder thermoplastic substances, linear or branched polyethylene, polypropylene, polyamides, polyesters or an acrylic mixture.

11. Method for the manufacture of a wall covering according to Claim 7, characterized in that the pressure applied on the assembly of the decorative layer and the lining during the thermal treatment of the assembly is between several hundred grams and several kilograms per cm<sup>2</sup>.

12. Machine for the assembly of two bands of which one comprises a thermoplastic covering, equipped with a heated drum and a counterpressure means, characterized in that the counterpressure means consists of a race in the form of an endless band surrounding at least one-fourth of the circumference of said drum and applied against said drum by means of guidance, return and tension rollers.

13. Machine according to Claim 12, characterized in that it comprises at least one tension roller with an adjustable position.



